



January 19th 2022 — Quantstamp Verified

Merit Circle Token Burner

This audit report was prepared by Quantstamp, the leader in blockchain security.



Executive Summary

Type	Token Burner				
Auditors	Souhail Mssassi, Research Engineer				
Timeline	2022-01-18 through 2022-01-18				
EVM	London				
Languages	Solidity				
Methods	Architecture Review, Unit Testing, Functional Testing, Computer-Aided Verification, Manual Review				
Specification	None				
Documentation Quality	Undetermined				
Test Quality	Undetermined				
Source Code	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Repository</td> <td style="padding: 2px;">Commit</td> </tr> <tr> <td style="padding: 2px;">merit-dao</td> <td style="padding: 2px;">d3a6b74</td> </tr> </table>	Repository	Commit	merit-dao	d3a6b74
Repository	Commit				
merit-dao	d3a6b74				
Total Issues	1 (0 Resolved)				
High Risk Issues	0 (0 Resolved)				
Medium Risk Issues	0 (0 Resolved)				
Low Risk Issues	1 (0 Resolved)				
Informational Risk Issues	0 (0 Resolved)				
Undetermined Risk Issues	0 (0 Resolved)				



▲ High Risk	The issue puts a large number of users' sensitive information at risk, or is reasonably likely to lead to catastrophic impact for client's reputation or serious financial implications for client and users.
^K Medium Risk	The issue puts a subset of users' sensitive information at risk, would be detrimental for the client's reputation if exploited, or is reasonably likely to lead to moderate financial impact.
▽ Low Risk	The risk is relatively small and could not be exploited on a recurring basis, or is a risk that the client has indicated is low-impact in view of the client's business circumstances.
○ Informational	The issue does not pose an immediate risk, but is relevant to security best practices or Defence in Depth.
? Undetermined	The impact of the issue is uncertain.
● Unresolved	Acknowledged the existence of the risk, and decided to accept it without engaging in special efforts to control it.
○ Acknowledged	The issue remains in the code but is a result of an intentional business or design decision. As such, it is supposed to be addressed outside the programmatic means, such as: 1) comments, documentation, README, FAQ; 2) business processes; 3) analyses showing that the issue shall have no negative consequences in practice (e.g., gas analysis, deployment settings).
○ Resolved	Adjusted program implementation, requirements or constraints to eliminate the risk.
○ Mitigated	Implemented actions to minimize the impact or likelihood of the risk.

Summary of Findings

Initial audit:

Through reviewing the code, we found **1** potential issues of various levels of severity:**1** low-severity issues. We recommend addressing this issue before deploying the code.

ID	Description	Severity	Status
QSP-1	Missing input verification	Low	Unresolved

Quantstamp Audit Breakdown

Quantstamp's objective was to evaluate the repository for security-related issues, code quality, and adherence to specification and best practices.

Possible issues we looked for included (but are not limited to):

- Transaction-ordering dependence
- Timestamp dependence
- Mishandled exceptions and call stack limits
- Unsafe external calls
- Integer overflow / underflow
- Number rounding errors
- Reentrancy and cross-function vulnerabilities
- Denial of service / logical oversights
- Access control
- Centralization of power
- Business logic contradicting the specification
- Code clones, functionality duplication
- Gas usage
- Arbitrary token minting

Methodology

The Quantstamp auditing process follows a routine series of steps:

1. Code review that includes the following
 - i. Review of the specifications, sources, and instructions provided to Quantstamp to make sure we understand the size, scope, and functionality of the smart contract.
 - ii. Manual review of code, which is the process of reading source code line-by-line in an attempt to identify potential vulnerabilities.
 - iii. Comparison to specification, which is the process of checking whether the code does what the specifications, sources, and instructions provided to Quantstamp describe.
2. Testing and automated analysis that includes the following:
 - i. Test coverage analysis, which is the process of determining whether the test cases are actually covering the code and how much code is exercised when we run those test cases.
 - ii. Symbolic execution, which is analyzing a program to determine what inputs cause each part of a program to execute.
3. Best practices review, which is a review of the smart contracts to improve efficiency, effectiveness, clarify, maintainability, security, and control based on the established industry and academic practices, recommendations, and research.
4. Specific, itemized, and actionable recommendations to help you take steps to secure your smart contracts.

Toolset

The notes below outline the setup and steps performed in the process of this audit.

Setup

Tool Setup:

- [Slither](#) v0.8.3

Steps taken to run the tools:

Installed the Slither tool: `pip install slither-analyzer` Run Slither from the project directory: `slither .`

Findings

QSP-1 Missing input verification

Severity: Low Risk

Status: Unresolved

File(s) affected: [contracts/TokenBurner.sol](#)

Description: The `token` variable in the `TokenBurner(L13)` lack a safety check in the address. The address-type argument should include a zero-address test, otherwise, the contract's functionality may become inaccessible or tokens may be burned in perpetuity.

Recommendation: It's recommended to undertake further validation prior to user-supplied data. The concerns can be resolved by utilizing a whitelist technique or a [modifier](#).

Automated Analyses

Slither

Slither has reported some false positive issues.

Test Results

Test Suite Results

`yarn test`

```
MeritToken
constructor
  ✓ Constructor args should be used (116ms)
  ✓ Should assign DEFAULT_ADMIN_ROLE to deployer (39ms)
mint
  ✓ Should work when calling from address which has MINTER_ROLE (158ms)
  ✓ Should revert when called from address without MINTER_ROLE (62ms)
burn
  ✓ Should work when calling from address which has BURNER_ROLE (152ms)
  ✓ Should revert when called from address without BURNER_ROLE
transfer
  ✓ transfer to token contract should fail
  ✓ transfer should work normally (108ms)

TokenBurner
  ✓ Burn should work (716ms)
```

Appendix

File Signatures

The following are the SHA-256 hashes of the reviewed files. A file with a different SHA-256 hash has been modified, intentionally or otherwise, after the security review. You are cautioned that a different SHA-256 hash could be (but is not necessarily) an indication of a changed condition or potential vulnerability that was not within the scope of the review.

Contracts

`1dd493384b51644cc49843b564dc9c33708811636ae792a054fe91121dcfc3f3 ./contracts/TokenBurner.sol`

Tests

`f0bb8485c1a86c5bd4fe39edba0860b0bd3eb9e992ed37fbb357922a5c014c64 ./test/TokenBurner.ts`

Changelog

- 2022-01-18 - Initial report

About Quantstamp

Quantstamp is a Y Combinator-backed company that helps to secure blockchain platforms at scale using computer-aided reasoning tools, with a mission to help boost the adoption of this exponentially growing technology.

With over 1000 Google scholar citations and numerous published papers, Quantstamp's team has decades of combined experience in formal verification, static analysis, and software verification. Quantstamp has also developed a protocol to help smart contract developers and projects worldwide to perform cost-effective smart contract security scans.

To date, Quantstamp has protected \$5B in digital asset risk from hackers and assisted dozens of blockchain projects globally through its white glove security assessment services. As an evangelist of the blockchain ecosystem, Quantstamp assists core infrastructure projects and leading community initiatives such as the Ethereum Community Fund to expedite the adoption of blockchain technology.

Quantstamp's collaborations with leading academic institutions such as the National University of Singapore and MIT (Massachusetts Institute of Technology) reflect our commitment to research, development, and enabling world-class blockchain security.

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